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# The impact of performance pay on sales and fundraising

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## Abstract

In recent years there has been wide criticism of bonuses and performance pay in different forms. This can often be traced back to the recent financial crisis. Empirical evidence on the effects of bonuses and performance related pay is increasing. We contribute to the discussion by analyzing the impact of changes in the payment structure of a large Dutch marketing company. Specifically, we investigate the consequences for company sales of higher fixed pay in combination with lower bonuses. Exploiting shift level data of individual workers we find that average productivity decreases when the pay structure shifts more to fixed pay. Further analysis shows that this is a pure incentive effect and not due to sorting.

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<sup>†</sup>This study is partly based on the author's thesis research at the University of Amsterdam.

## 1. Introduction

There has been a lot of discussion on bonuses and performance related pay in recent years. Public outrage with bonus structures in high level jobs providing the wrong incentives causes governments to consider bonus inhibiting regulations. At the same time plans are made to introduce performance pay for federal employees in both the US and Europe.<sup>1</sup>

Including performance pay in compensation systems is one of the instruments used to provide workers with incentives to maximize their productivity. As the output of companies depends largely on the productivity of its workers, it is important to motivate employees to achieve maximum performance. Performance pay is the opposite of fixed pay, as it depends on the variable performance of the worker. An increasing amount of firms implement performance related compensation and even the public sector is considering to incentivize productivity (of e.g. teachers or police officers) by implementing performance related pay (Van Herpen et al., 2005).

There is a large body of theoretical literature on the incentives associated with different pay structures, i.e. how firms design pay structures to induce employees to maximize performance.<sup>2</sup> Performance related pay, i.e. piece rates and bonuses, is typically beneficial for productivity for two reasons. First, performance related pay can be used to increase the effort of workers. Second, it may induce a sorting effect in the sense that it attracts new workers with relatively high ability. Empirical research is either based on firm level data or personnel data from a single firm. Examples of the former are Origo (2009) on Italian firms and Gielen et al. (2010) on Dutch firms. Some examples of the latter are Lazear (2000) on the impact of introducing piece rates within Safelite Corp., Van Herpen et al. (2005) on the effects of performance measurement and piece rates on motivation within a Dutch company and Kishore et al. (2013) on bonuses and commissions. Typically the empirical evidence is in favor of performance related pay with case studies providing larger effects.

This study contributes to the empirical literature on pay structures by analyzing personnel data of a single firm. We analyze how worker behavior and productivity depend on performance pay systems by analyzing data provided by a large field marketing company

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<sup>1</sup>See e.g. The New York Times (2014, July 31) for a report on British regulators setting strict rules for bonuses in banks, The Washington Post (2009, June 23) on US federal employees' pay and the NRC Handelsblad (2012, October 23) and The London Times (2012, May 1) on performance pay plans in the Netherlands and the UK respectively.

<sup>2</sup>See Prendergast (1999) for a review of theoretical literature on incentive pay.

based in the Netherlands. The company offers retailers, publishers and charities a sales and fundraising channel. Although the company operates in four different markets in Europe, the data used for analysis in this paper were collected during their activities in the Netherlands only. The data cover all of 2013 and January through October of 2014.

As of the first of January 2014, the company changed its pay structure by introducing a higher fixed pay and lower variable pay. The variable part of the wage was divided into both piece rate pay and bonuses. Incentive pay in the form of piece rates is defined by payment on the basis of output (Lazear, 1986). Bonuses are granted when a specific output number is reached, this can be both individually and as a team. As the fixed pay went up, piece rates stayed unchanged and bonuses went down. The data of roughly 3000 unique employees in 2013 and 2200 in 2014 are available, with worker specific shift performance as the appropriate performance measure. This shift information will be analyzed using a range of models and estimation techniques, to identify the effects of the payment system change on workers' performance.

The rest of this paper is organized as follows. Section 2 will describe in detail the research design, in particular the various compensation systems covered in this study. In Section 3 relevant literature will be reviewed to provide a sound theoretical background of the incentives and choices within the different payment systems. Section 4 reports the results from the empirical analysis. Section 5 concludes.

## **2. Research design**

In this Section we describe the compensation system of the Dutch marketing company and provide insight into the changes in monetary incentives for employees. The company employs three types of positions, i.e. talents, promoters and captains. A 'talent' is an employee that has worked less than 5 shifts, a 'promoter' is an employee that has worked at least 4 shifts and performed well enough to be offered a contract. A 'captain' is the leader of the shift team, which depending on the project consists of 2 to 4 workers. Talent and promoter functions have identical pay. Captains, however, get a higher base salary as they are paid extra for organizational activities as team leader. Furthermore, in some cases a captain gets higher bonuses.

The main task of workers is sales and fundraising. The result of a shift can be summarized in a score, which is basically the sales count. The pay structure of the company

consists of fixed pay, piece rates and bonuses. Irrespective of the shift score the workers earn a fixed pay, which is determined by the number of hours worked and a hourly rate. Furthermore, for each sale the worker is on a piece rate, while at certain scores an additional bonus can be obtained. Bonuses can be earned individually or as a team.

As of the first of January 2014, the company changed its pay structure. One of the reasons for this change was to decrease the employee turnover and, hence, to lower separation rates. Piece rates stayed unaltered, while fixed pay and bonuses did change. An overview of the old and new fixed pay is reported in Table 1.

<Table 1 about here>

In the old compensation system there was no age differentiation in fixed pay. Clear from Table 1 is the age differentiation in fixed pay in the new system and the resulting differences across ages for all workers. Fixed pay was increased for all age categories above 18, while it was slightly decreased for ages 17 and 18 (and 19 too for captains). Especially older workers benefit substantially from the new fixed pay.

An overview of the complete compensation structures, i.e. including piece rates and bonuses, is given in Figure 1. The payment structure for all ages from before the change in January 2014 is given by the dotted (promoters/talents) and dash dotted (captains) lines. Both lines are upward sloping reflecting the piece rate,<sup>3</sup> while the kinks in the graph represent the bonuses. Regarding the latter, visible are the different bonuses, both in magnitude and for different scores.

<Figure 1 about here>

Changes in pay structure were different for 7 different age groups as of 1/1/2014. Therefore, the new payment structure is represented by 14 other lines, with each line representing an age with either a promoter/talent function or captain function. For ease of exposition, in Figure 1 we only show the new pay structure for workers of age 20, which is the average age. Figure 1 suggests that the new compensation system provides less monetary incentives for the average worker as the slopes of the corresponding lines are less steep than in the old

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<sup>3</sup>Piece rates vary across products (higher commissions for higher donations for example), but do not vary between the old and new compensation system. Therefore, for ease of exposition a fixed commission of 6 euros per sale is taken in all Figures. This fits the purpose of this analysis, as only the differences between the old and new system are important.

system. We next analyze in more detail for different ages and functions the consequences of the new system.

## 2.1. Promoters and Talents

We analyze youngest (17) and oldest (23) worker categories in more detail. If we look at promoters and talents aged 17 in Figure 2, we see that compensation is quite close in the new and old systems up to a performance of 6. Above 6, the old system awarded higher compensation for all scores. The monetary incentive for age 17 to perform above a score of 6 is therefore less in the new system.

<Figure 2 about here>

If we look at promoters and talents with age 23 or higher in Figure 2 we see a very different pattern. Compensation in the new system is substantially higher for all scores below 9. The difference in compensation is largest in the lower scores. The old compensation system almost catches up in compensation for 23 year olds at a score of 9 and is above the new system for higher scores. This suggests a decreased incentive to perform up to a score of 9 in the new system compared to the old system.

Both fixed pay and bonuses are different in the old and new compensation systems, while piece rates are unchanged. For ease of comparison, we fit a linear trend through the performance related pay, i.e. piece rate and bonus, for the new and old compensation systems. Note that this linear trend is the same for all age groups in the new system. The slope coefficient can be interpreted as the average variable pay. Variable pay in the old system is on average 13.58 euros per unit, while for the new system it is 9.70 euros only. This shows that the increase in compensation of extra output for promoters and talents was larger in the original compensation structure than in the new structure introduced in 2014. It therefore implies a smaller monetary incentive from performance related pay in the newer system.

Comparing the two graphs in Figure 2, the direction of the effects of the change will be the same for all ages. However, their magnitude will most likely differ across age groups because the absolute changes in wages are pretty different. This justifies an empirical analysis of the change in compensation system for different age groups, as we shall see.

## 2.2. Captains

The representation of the two compensation systems for captains is shown in Figure 3.

<Figure 3 about here>

For 17 year old workers the results are somewhat different to the results for the promoter/talent employees, i.e. for younger captains the old system produces higher compensation than the new system for all scores. For older workers the results are more or less the same compared with promoters/talents. Age 23 or higher receives more compensation in the new system for scores under 9, while the old system is more beneficial for higher scores. The average variable pay is also for captains less in the new system than in the system before 2014. This indicates a smaller monetary incentive to perform for captains in the new system analogous with the promoter/talent results. The difference in variable pay is even larger compared with promoters/talents (15.39 versus 9.70 euros), which suggests an even more negative monetary incentive for captains compared to promoters/talents in the new system.

## 2.3. Team bonuses

Team bonuses are awarded only when the team performs well as a whole, with average scores of 6 and 9 in the old system and 4,6,8,10,12 in the new system. In the new system there is no more individual bonus and only team bonuses are awarded. This changes part of the dynamics of the incentives for the employees.

<Figure 4 about here>

In Figure 4 the compensation structures for both promoters/talents captains are reported without the team bonuses. This presents a situation in which an employee is faced with an underperforming team incapable of achieving the score required for a team bonus. Clear in both graphs is the linear form of the newer compensation structure, and the much steeper curve of the old compensation system (a slope of 10.87 for the old and 6 for the new system). It is obvious that in a situation like this, both a promoter/talent and captain will have less monetary incentive to achieve higher scores in the new than in the old system.

## 2.4. Second change

The company implemented a second change in its compensation structure in July 2014. As the management of the company became aware of the drop in incentive that the new system had caused, they decided to change the structure for captains. The captains once again received individual bonuses and their fixed wage was reduced to the level of promoters and talents.

<Figure 5 about here>

Figure 5 represents the new situation for captains. The linear trend approximating performance related pay in the newest system is slightly smaller than it was in the older system (with a coefficient of 14.57 in the newest versus 15.39 in the older system). We therefore conclude that for captains working in the newest wage system the monetary incentive to perform is higher than in the January till June 2014 system, but somewhat lower than the system from before 2014.

## 3. Theoretical background

In this section we discuss relevant theories to provide a theoretical background for interpreting the results of the empirical analysis. We first report briefly the predictions from agency theory and motivation crowding theory, which are both relevant and important for performance pay structures. We next discuss some empirical evidence for both approaches. By no means we intend to provide an exhaustive review of the literature, but we use the main insights to define a number of predicted outcomes for the empirical analysis.

### 3.1. Agency theory

Agency theory offers an economic approach to human motivation and performance. It is the leading perspective used in economics to support financial incentives to motivate or increase performance (Young et al, 2012). An important assumption of the agency theory is that individuals make rational decisions based on their utility functions, which depend on some combination of income and leisure (Chambers and Quiggin, 2005). The principal-agent framework of the agency theory acknowledges that the principal, the risk-neutral employer, who rewards the agent, the risk-averse employee, might have different interests than the agent. The agent's interests are not known to the principal, causing a



situation of asymmetric information. As the agent pursues its own maximum utility, the principal can expect the agent to take actions to maximize his utility, possibly contrasting the principal's objectives. The agent is assumed to have priorities that are not equal to the principal's, so the agent will likely pursue personal objectives ignoring their responsibilities to the principal if there is no financial consequence. Therefore an important issue for the principal is how to structure the relationship and compensation to motivate the agent to work towards the principal's objectives.

There are two general approaches the principal can take. The first approach entails specifying and monitoring the agent's work activities. As the principal needs to have a clear view and understanding of the agent's activities beforehand and monitor the activities during, this can be very expensive (Young et al., 2012). The second approach involves forcing the agent to bear at least some of the production risk. An optimal incentive contract therefore would involve a performance pay structure which connects the agent's pay to production and thereby indirectly to the agent's effort (Kunz and Pfaff, 2002). This imposes measurement costs on the principal, as it is crucial to the performance pay contract that performance is measured accurately. The company in this study combines both approaches, using the first approach to filter its workers by dismissing underachieving workers and the second approach to motivate workers to achieve maximum sales.

### **3.2. Motivation crowding theory**

Psychological theories have been inserted into economic theory on motivation, in an attempt to explain empirical results from mainly experimental research contradicting agency theory. Motivation can be divided into intrinsic and extrinsic motivation. Extrinsic motivation is influenced by external interventions, like monetary compensation, and widely used by agency theorists to assess the amount of effort an agent is expected to carry out (Van Herpen et al., 2005). Intrinsic motivation, largely ignored by agency theorists, causes employees to undertake tasks without monetary compensation. For example, for immediate need satisfaction or for its own sake (Calder and Staw, 1975).

Within psychology there are some theories that predict a possible reduction in workers' output by adopting performance pay. Experimental research by Deci (1971) first showed that, at least in certain situations, intrinsic motivation to perform decreases when monetary rewards are introduced. Crowding theory extends this idea, by linking intrinsic motivation to agency theory. It states that under certain conditions the effects of monetizing incentives

on individual performance might be negative (Frey and Jegen, 2001). The agent perceives the performance related pay as a form of external control. This increases the external pressure on the agent and causes the intrinsic motivation to be ‘crowded out’, which eventually causes a decline in productivity. The opposite effect occurs when the agent perceives the external intervention in the form of performance pay as supporting or informative. This process causes ‘crowding in’ which may result in an increase in intrinsic motivation (Frey and Oberholzer-Gee, 1997). The total resulting effect of monetary compensation on motivation is therefore undetermined.

### **3.3. Empirical evidence**

Both agency theory and crowding theory provide a link between the change in the compensation system and workers’ effort, which in turn affects workers’ productivity. Agency theory provides a transmission channel through incentives on extrinsic motivation and subsequently on utilities and workers’ effort. Crowding theory links the change in compensation through workers’ perception and intrinsic motivation to workers’ effort. A priori it is therefore not clear what empirically the output effects are of a change in the compensation system.

Agency theory predicts that performance related pay, i.e. piece rates and bonuses, is beneficial for productivity for two reasons. First, performance related pay can be used to increase the effort of workers. Second, it may induce a sorting effect in the sense that it attracts new workers with relatively high ability. Empirical evidence is either based on firm level data or personnel data from a single firm. Examples of the former are Origo (2009) on Italian firms and Gielen et al. (2010) on Dutch firms. Some examples of the latter are Lazear (2000) on the impact of introducing piece rates within Safelite Corp., Van Herpen et al. (2005) on the effects of performance measurement and piece rates on motivation within a Dutch company and Kishore et al. (2013) on bonuses and commissions. Typically the empirical evidence is in favor of performance related pay with case studies providing the larger effects. For example, Lazear (2000) analyzed the effects on worker’s productivity of an auto glass company’s transition from a full fixed pay structure to a full piece rate system. He found a dramatic increase in performance, with average output per worker increasing by 44 percent.

Empirical evidence for the crowding out effect is mixed. Deci et al. (1999) conclude from a meta-analysis of 128 experiments that rewards have a negative impact on intrinsic

motivation of students. The results from Gneezy and Rustichini (2000), however, are more subtle. They find that the impact of monetary incentives on performance is non-monotonic. The usual result of a positive relation between compensation and performance applies, but performance may be lower because of the introduction of the compensation. Using worker survey data Van Herpen et al. (2005) find a positive association between extrinsic motivation and monetary compensation, but no significant evidence for intrinsic motivation to support the crowding out theory. Finally, in a recent review of both psychological and economic literature Festré and Garrouste (2015) conclude that the empirical relevance of the crowding out effect is still strongly debated.

### **3.4. Predictions**

From the analysis of the company's compensation systems it is clear that for all employees the monetary incentive to perform higher is lower in the compensation system implemented in January 2014 compared to the system in 2013. The newest system introduced in July 2014 increases the monetary incentive for captains only bringing it back to almost the level of the old system in 2013.

We expect that the agency theory applies more than the crowding out hypothesis for several reasons. First, in the old compensation system workers have been subject to performance related pay already. Because workers are already used to piece rates and bonuses, it is expected that their intrinsic motivation will not change much in the new system. Second, as discussed before the changes in the system are large enough to expect a significant change in extrinsic motivation and therefore effort.

Based on agency theory we therefore expect the following for the data analysis (see e.g. Lazear, 2000). First, average effort will not increase in the January 2014 system, as the average return on added performance is less in the new than in the old compensation system. Second, the variance in scores will decrease. If we assume that a worker will choose to invest less effort if it can produce the same utility; older workers in the new system will likely be able to achieve higher levels of utilities with less effort, and younger workers will be able to achieve the same utility with the same effort at lower score levels, and only a lower level of utility at the higher levels. Third, average age will not decrease. As average pay at any score for higher aged individuals rises with the new system, a decrease in average age would be counter intuitive and could point towards unobserved influences.

Additionally, the change in compensation system may also affect the composition of

the workforce through both the changed cost for the employer and the different wages for the prospect employees. Through changes in hiring and applying by future employees the changes might cause sorting and change the composition of the workforce, which can in turn affect the productivity of the workers.

## 4. Empirical analysis

The data supplied by the Dutch marketing company contain information on individual workers and shifts from the beginning of 2013 through October 2014. The data contain 57,967 shifts worked in 2013 (whole year) and 44,160 shifts in 2014 (January through October). The data can be viewed as (highly unbalanced) panel data with individual employees performing shifts in multiple periods. Descriptive statistics on important variables are shown in Table 2. We distinguish three regimes: (1) the old regime of 2013; (2) the new regime starting in January 2014 (labeled 1/1/2014); (3) the newest regime after the second change in July 2014 (labeled 1/7/2014).

<Table 2 about here>

The productivity measure used in this analysis is the score of a single worker in one shift of five hours. This is the measure which the company uses to evaluate its employees and is the basis for the performance based pay. The average score achieved in 2013 was 4.28 units sold with a standard deviation (sd) of 7.01. In the 1/1/2014 wage regime an average score of 2.94 (sd is 3.23) results, while the 1/7/2014 regime has a slightly higher average score of 3.34 (sd is 3.45). These simple statistics suggest that switching from performance related pay (piece rates and bonuses) to hourly wages leads to lower output and less variation corroborating the theoretical and empirical results of Lazear (2000).

### 4.1. baseline regression results

The simple statistics in Table 2 do not take into account other relevant factors. In our regression analysis below we distinguish individual workers' attributes, organization specific factors and external influences. Observed worker attributes are position (talent, promoter, captain), tenure (number of shifts worked) and age (years) of the worker. Organization specific factors are location and projects. As the company lets its employees work on different projects over time, with different characteristics and results for each project, the

project fixed effects are an important addition to the individual control variables. Of the 274 unique projects that the company has conducted in the data’s timespan, 29 span all three wage regimes, 76 have seen two and 169 only one of the three regimes. Finally, sales teams mainly operate outdoors and therefore scores will depend on weather conditions, which can influence the amount and willingness to buy. We use daily temperature and rainfall data from the Royal Netherlands Meteorological Institute<sup>4</sup> to control for these external influences.

We estimate a variety of linear regression specifications. A typical regression has the following form:

$$y_i = \beta_0 + \beta_1 d_{1i} + \beta_2 d_{2i} + \gamma' w_i + \varepsilon_i, \quad (4.1)$$

where  $y_i$  is the score of an individual worker in a particular shift. The dummy variables  $d_{1i}$  and  $d_{2i}$  indicate the compensation system:

$$\begin{aligned} 2013 & : d_{1i} = 0, d_{2i} = 0, \\ 1/1/2014 & : d_{1i} = 1, d_{2i} = 0, \\ 1/7/2014 & : d_{1i} = 0, d_{2i} = 1. \end{aligned}$$

The coefficients  $\beta_1$  and  $\beta_2$  are the parameters of interest because they measure the difference in scores due to a change in the performance pay system. The vector  $w_i$  contains control variables (worker attributes, organization factors and external influences) and  $\varepsilon_i$  is an error term. All linear specifications are estimated by Ordinary Least Squares (OLS). As employees work in teams, performances of individual workers within the same teams might be correlated. To account for this and other exogenous daily factors, we therefore supplement coefficient estimates with clustered standard errors where clusters are chosen to depend on the date of a shift.

<Table 3 about here>

Table 3 reports estimation results for various choices of the set of control variables. Column (1) is a simple difference in means analysis without any controls showing that both regime changes in incentive pay have had a significant impact on performance. Adding worker attributes (position, age, tenure) and weather conditions (temperature, rainfall) as control variables results in a similarly large significant effect of the change in wage system

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<sup>4</sup>We used the data from their weather report station 'de Bilt'.

as can be seen from column (2). The explanatory power is still low, however, as differences between projects and locations are ignored by this specification. Including dummy variables for the company's office locations and 35 project categories produces smaller, but still significant negative coefficients as can be seen from columns (3) and (4).

Because the wage system and projects are correlated, since some of the projects ran through only one system and some through all, including variables related to the projects will most likely absorb some of the effect of the wage system change. This is confirmed by regressing score on the individual variables, weather indicators, location dummies and furthermore 274 project fixed effects. The results of this regression are in column (5) of Table 3. Adding the project fixed effects leads to a large increase of the  $R^2$  from 0.202 to 0.675 showing their relevance for explaining the cross-sectional variation in shift scores. Furthermore, estimated system effects drop (in absolute value) 50% in magnitude. Nevertheless, pay system change effects are significant and large. The regime coefficients represent the effect of the change on the individual incentives for the employees. The switch from the 2013 to 1/1/2014 system reduces sales by 0.424 unit sold per shift with hardly any additional effect caused by the 1/7/2014 system. The average score is 4.28, which implies a reduction in sales of around 10%.

## 4.2. sensitivity analysis

We consider a number of alternative specifications to our baseline regression as reported in the last column of Table 3. The results of these various robustness checks are reported in Table 4, which for ease of comparison reports the baseline estimates of both regimes switches in row (1).

To further control for unobserved heterogeneity over time, we include fixed effects for every week. Row (2) of Table 4 reports estimation results adding week dummies. The coefficient for the 1/1/2014 system grows slightly compared to the specification without week dummies and the coefficient for the 1/7/2014 system is somewhat lower than before.

<Table 4 about here>

The dependent variable, i.e. shift score, has so far been used as a continuous variable in a linear regression analysis. The results of such linear regressions produce significant results and offer easier interpretation in the sense that the coefficients are marginal effects. The actual format of the scores, however, is a count. Different estimation techniques

are available for count data. Maximum Likelihood estimation results using Poisson and Negative Binomial count models are reported in rows (3) and (4) respectively.<sup>5</sup> The results of these count data regressions are in line with the results found in the linear specifications. Both regressions show a significant negative impact of the system changes. The implied marginal effect of the introduction of the 1/1/2014 regime equals -0.67 and -0.50 in the Poisson and Negative Binomial model respectively. These numbers are (in absolute value) larger than the results from the linear model.

Row (5) reports estimation results using only January-June data for both 2013 and 2014. In other words, it compares the period in which the 1/1/2014 system was used in 2014 with exactly the same period in 2013. Note that the second regime switch is therefore not identified as these data have been excluded. The results are very similar to the estimates in the baseline regression, which is as expected. Row (6) considers only the period from the first of July through the 15th of October in both 2013 and 2014. This is the period of available data for the 1/7/2014 system. This regression shows no significant effect for the pay system change, which is a somewhat remarkable result.

### **4.3. sorting**

The large and significant effects of the compensation system changes are clear in all regressions presented. There are two possible interpretations of this effect. First the pure incentive effect of the regime change on extrinsic motivation, causing a decrease in effort and subsequently score. Second the effect might be due to sorting, as the workforce might have changed in composition due to the different compensation system.

To see the effects of the system changes on workforce composition, a quick look at average ages shows an increase in average age of almost 0.7 years (see Table 2). This increase in the number of older workers can be explained by the differentiation in wage structure across ages. Higher ages earn more fixed pay than lower ages in the newer compensation systems. The increased average age can have both a negative and positive effect on output. Since age is significant across all regressions and higher ages indicate higher scores, one might expect average scores to increase with an increase in the average age of the employees. In this case the opposite might be true. As higher aged employees now earn the same wages for lower score levels, lower ability individuals might now be able

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<sup>5</sup>Comparing the two distributions with the empirical score distribution it is clear that the Negative Binomial distribution provides a better fit, which is further confirmed by a goodness of fit test.

to earn satisfactory wages and apply. This might cause the ability of the average worker to decline and thus reducing score levels.

We distinguish between incentive and sorting effects by exploiting the longitudinal nature of the data. The dataset can be viewed as panel data containing multiple observations over time for a set of workers. To control for the unobserved ability of individual workers, we include fixed effects for every single worker. When adding these 4,222 worker specific dummies to the model (row (2) of Table 5), the effects of the regime changes remain large and significant. The coefficient estimates are similar to the baseline results and can be interpreted as pure incentive effects, i.e. controlling for unobserved worker ability.

<Table 5 about here>

To further control for sorting we re-estimate the baseline model including only data from individuals who have been working for the company in all three compensation systems. We thus drop new workers and only analyze the development of productivity of workers who have been active before and after the pay structure changes. Row (3) shows the estimates, which are again very similar to the original estimates. In row (4) we again include worker fixed effects and find that most of the productivity differences reflect an incentive effect. Finally, in row (5) we compare the productivity of new and old workers using only the 2014 data. We introduce a dummy indicator, which is one for individuals who started working in 2014. The insignificant coefficient implies that ability of new and old workers is not different, hence sorting effects are largely absent.<sup>6</sup>

#### 4.4. heterogeneous effects

As discussed earlier, the consequences of the wage system changes are different among ages. We therefore split the full sample into 5 age-specific subsamples ranging from <18 to >23 years. The regression results in Table 6 for different age groups are in line with the expectations formed in the compensation system analysis. As higher age groups earn more fixed pay and have the option to achieve the same utility with much less effort, the effect on performance tends to be larger for the higher ages as can be seen in Table 6. The effects become smaller down to age 18, then rise a little bit for the lowest ages. This might be explained by the fact that from ages 18 and younger, the employees in the new

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<sup>6</sup>The interpretation of the 1/7/2014 coefficient is different now because the control group is 1/1/2014 instead of the 2013 system.



compensation system earn both less fixed pay and less performance based salary, resulting in a much lower monetary incentive for any score.

<Table 6 about here>

The heterogeneous effects, depending on age, are more clearly shown in the last column of Table 6. This regression simply adds the interactions of both regime changes with age. Coefficients of both interactions are significantly negative indicating that the negative impact of changes in the wage system have been more severe for older ages, as expected.

We also analyze the consequences of the wage system changes for different positions. As discussed earlier, the second wage change only concerned the captains. We therefore split the full sample into 3 position-specific subsamples, i.e. captains, promoters and talents.

<Table 7 about here>

It is clear from Table 7 that the effects of the second wage structure (1/7/2014) are small compared with the first change (1/1/2014). Captains perform slightly better after the second change, while the opposite holds for promoters and talents. None of these coefficients, however, is significant reflecting the fact that the second wage change was relatively minor compared to the first change.

The regression results for different positions are in line with the expectations formed in the compensation system analysis. The difference in variable pay was largest for captains and indeed these workers experience the largest drop in productivity as can be seen from Table 7. Talents are relatively insensitive to the performance pay system, which can partly explained by the fact that their variability in scores is large.

## 5. Concluding remarks

We have analyzed empirically the relation between monetary compensation and performance. The effects of changes in the compensation method have been estimated using worker level data from a large field marketing company based in the Netherlands. The company has implemented a new pay structure with higher fixed pay and lower bonuses as of January 2014. Using data from 2013 and 2014, i.e. before and after the intervention, our estimated regression specifications indicate a significant reduction in individual shift scores due to the lower monetary incentive to perform. Although the details of the compensation

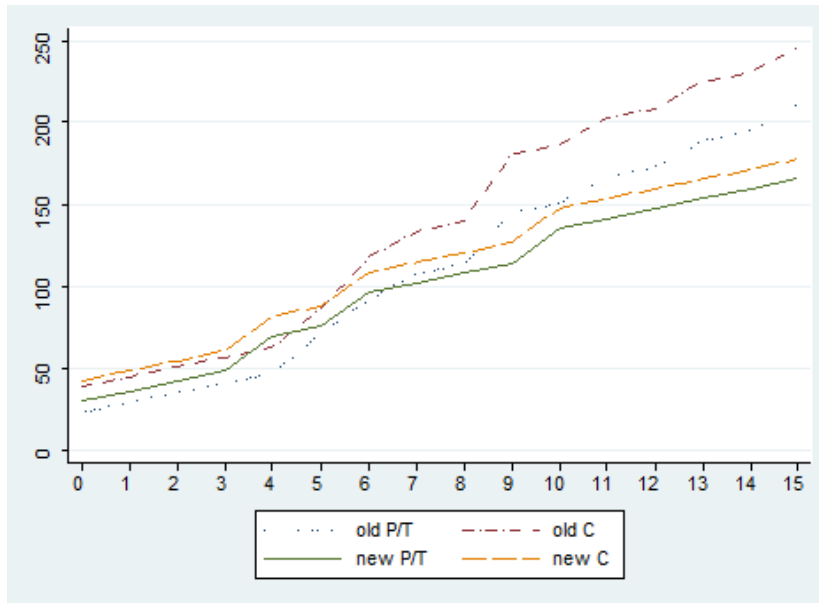
system and the changes for different positions and ages are quite intricate, the results for all combinations of worker positions and ages are significant and large. The reduction of around ten percent in average added return on performance has caused a similar reduction in actual sales.

The empirical results corroborate with the primary prediction of agency theory. Average effort has at least not increased in the new compensation system. The sharp drop in performance found, even when controlling for a host of relevant determinants including location and project fixed effects, shows that employees have most likely decreased their effort resulting in lower sales performance. No evidence was found to support the crowding theory. This theory proposes that a higher fixed pay as implemented by the company will be likely seen as fair and more supportive than the old system with lower fixed pay. Crowding theory suggests a possible increase in intrinsic motivation followed by an increase in performance (or at least not a decrease). The opposite was found, however, suggesting that the effects of extrinsic motivation and monetary incentives are larger in this case.

We have exploited the longitudinal dimension of the data to distinguish between incentive and sorting effects. Controlling for ability by including worker specific effects we find pure incentive effects, while sorting is largely absent. We furthermore have analyzed heterogeneity in the incentive effects by estimating age and position specific regressions. We find that older workers and captains experienced the largest drop in productivity corroborating with the fact that changes in the wage structure were largest for those workers.

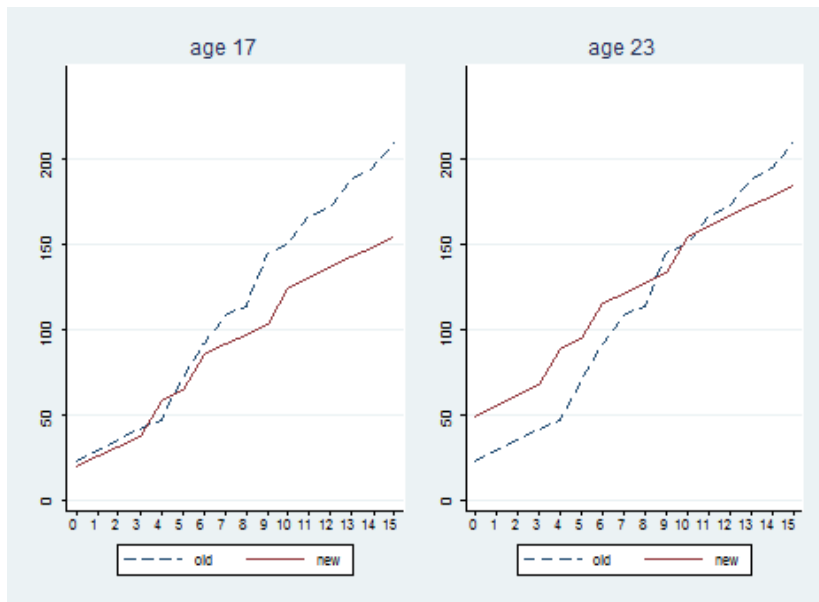
Our analysis can be viewed as a case study and adds to the empirical literature on the effectiveness of performance pay systems. The composition of the workforce at the company under investigation is quite specific, with a narrow age range and mostly part-timers (students). Nevertheless, there are a number of comparable sectors for which our results might be especially relevant. Examples are the hospitality industry, marketing companies, supermarkets, the retail industry and sales companies. Additionally, the results of this analysis have to be taken into account by policy makers, when wage legislation like minimum wages are considered. The discussion on minimum wages focuses mainly on the end wage of the workers and not on its structure. The effect of this structure on the performance of workers, like demonstrated in this analysis, can cause a double dip effect for companies required to pay a minimum wage if this wage reduces the workers' performance-pay incentives.

Figure 1: old and new compensation structures for 20 year old workers



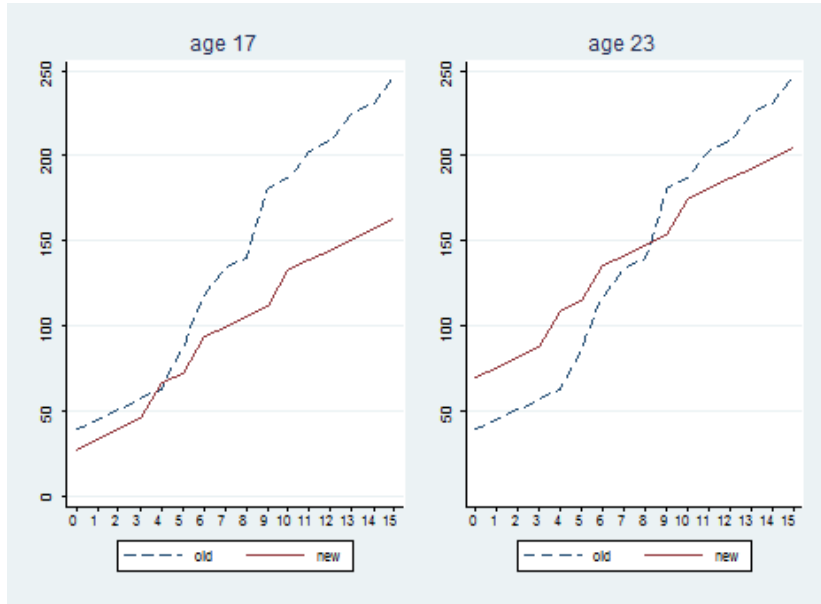
Note: P/T is Promoters and Talents, C means Captains. Vertical axis is compensation in euros, while horizontal axis is the number of sales.

Figure 2: old and new compensation structures for Promoters/Talents



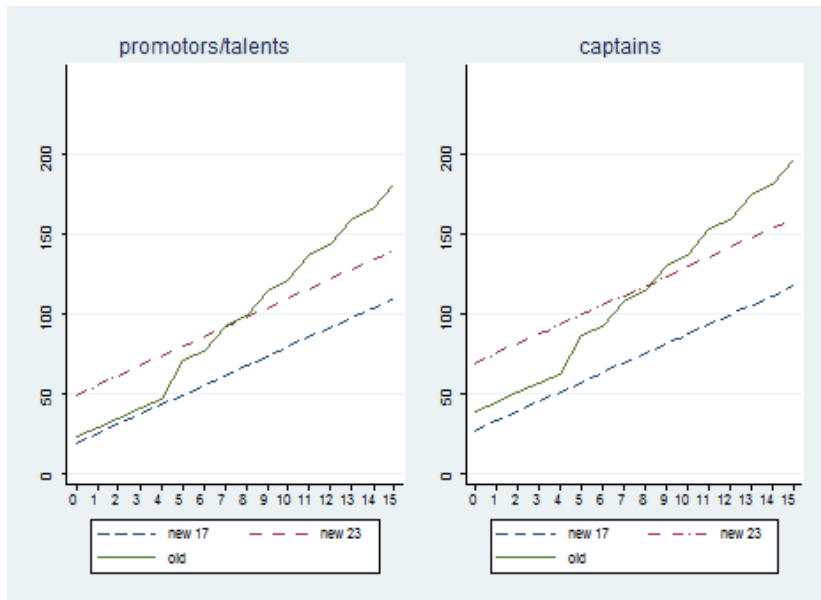
Note: see Figure 1.

Figure 3: old and new compensation structures for Captains



Note: see Figure 1.

Figure 4: old and new compensation structures without bonuses



Note: see Figure 1; "17" and "23" refer to age category.

Figure 5: second compensation structure change for Captains



Note: see Figure 1;. "new 2" refers to second change implemented in July 2014.

Table 1: fixed pay per shift

	Promoters/Talents		Captains	
age	old	new	old	new
all	23.40		39.00	
17		19.58		27.42
18		22.56		31.59
19		26.03		36.44
20		30.49		42.69
21		35.95		50.32
22		42.15		59.01
23		49.58		69.42

Notes: all numbers are in euros.

Table 2: descriptive statistics

regime	2013	1/1/2014	1/7/2014
total number of shifts	57,927	27,112	17,015
number of shifts by Captains	14,950	7,460	4,288
number of shifts by Promoters	34,401	15,863	10,259
number of shifts by Talents	8,576	3,789	2,468
total number of Projects	165	137	106
average (sd) score	4.28 (7.01)	2.94 (3.23)	3.34 (3.45)
average age	20.16 (2.25)	20.62 (2.26)	20.82 (2.26)
percentage female	37.88	38.85	38.27
percentage male	62.12	61.15	61.73

Notes: based on 102,062 observations; numbers between parentheses are standard deviations.

Table 3: explaining individual worker shift scores

	(1)	(2)	(3)	(4)	(5)
1/1/2014	-1.342	-1.376	-0.944	-0.539	-0.424
	(0.085)	(0.083)	(0.071)	(0.051)	(0.044)
1/7/2014	-0.936	-0.959	-0.508	-0.547	-0.415
	(0.088)	(0.093)	(0.092)	(0.063)	(0.065)
promoter		-1.308	-0.952	-0.830	-0.884
		(0.039)	(0.038)	(0.034)	(0.028)
talent		-1.954	-1.576	-1.286	-1.563
		(0.146)	(0.095)	(0.075)	(0.045)
age		0.059	0.022	0.083	0.074
		(0.009)	(0.009)	(0.007)	(0.005)
tenure		-0.002	0.001	0.002	0.003
		(0.000)	(0.000)	(0.000)	(0.000)
rainfall		-0.002	-0.002	-0.002	-0.001
		(0.001)	(0.001)	(0.001)	(0.000)
temperature		0.001	0.001	0.000	0.001
		(0.001)	(0.001)	(0.000)	(0.000)
location effects (16)	no	no	yes	yes	yes
project category effects (35)	no	no	no	yes	no
project effects (274)	no	no	no	no	yes
R <sup>2</sup>	0.011	0.023	0.202	0.386	0.675

Note: number of observations is 102,062. Clustered standard errors are between parentheses.

Table 4: sensitivity analysis

	1/1/2014	1/7/2014
(1) baseline results	-0.424 (0.044)	-0.415 (0.065)
(2) including week effects	-0.520 (0.053)	-0.316 (0.067)
(3) Poisson regression	-0.179 (0.014)	-0.178 (0.016)
(4) Negative Binomial regression	-0.131 (0.013)	-0.141 (0.016)
(5) january-june data only	-0.509 (0.061)	
(6) july-october data only		0.080 (0.094)

Note: Worker attributes, weather conditions, location and project effects included as control variables. Clustered standard errors are reported between parentheses.

Table 5: sorting

	1/1/2014	1/7/2014	new worker
(1) baseline results	-0.424 (0.044)	-0.415 (0.065)	
(2) including worker effects	-0.436 (0.066)	-0.448 (0.092)	
(3) only workers active in all regimes	-0.443 (0.054)	-0.526 (0.087)	
(4) same, including worker effects	-0.337 (0.071)	-0.445 (0.103)	
(5) 2014 data only		0.036 (0.063)	0.014 (0.033)

Note: see Table 4. The dummy variable "new worker" is 1 for workers who started in 2014.



Table 6: age-specific regressions

	>22	22	21	20	19	<19	all
1/1/2014	-0.766 (0.080)	-0.419 (0.105)	-0.587 (0.089)	-0.435 (0.085)	-0.250 (0.070)	-0.391 (0.065)	-0.419 (0.044)
1/7/2014	-0.744 (0.121)	-0.667 (0.157)	-0.674 (0.124)	-0.262 (0.111)	-0.309 (0.111)	-0.438 (0.116)	-0.401 (0.066)
age							0.097 (0.080)
age*1/1/2014							-0.053 (0.011)
age*1/7/2014							-0.057 (0.014)
R <sup>2</sup>	0.717	0.600	0.695	0.645	0.686	0.730	0.675
N	16,215	11,014	14,448	18,208	21,197	20,972	102,054

Note: Worker attributes, weather conditions, location and project effects included.

Number of observations is N. Columns headings indicate age categories in years.

Table 7: position-specific regressions

	1/1/2014	1/7/2014	N	R <sup>2</sup>
baseline	-0.424 (0.044)	-0.415 (0.065)	102,054	0.675
captains	-0.620 (0.070)	-0.572 (0.114)	26,698	0.549
promoters	-0.444 (0.050)	-0.487 (0.072)	60,523	0.649
talents	-0.157 (0.064)	-0.235 (0.103)	14,833	0.812

Note: see Table 4.

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